

WHAT IS CLAIMED IS:

1. A light-wave circuit module comprising:

a substrate having a spot of substantially circular  
5 concave shape;

an optically reflective film formed along an inner  
surface of said spot; and

a planar optical waveguide passing through said spot;

wherein light of said optical waveguide is reflected  
10 and focused obliquely upward by said optically reflective  
film in said spot.

2. The light-wave circuit module according to claim 1,

wherein a portion of said planar optical waveguide is  
15 located in said spot;

said portion of the planar optical waveguide is  
formed on said substrate, said optically reflective film  
being disposed between said portion and said substrate; and

light that is guided along said planar optical  
20 waveguide leaks into said spot and is focused on a focal  
point that is set by said substantially circular concave  
shape.

3. A light-wave circuit module comprising:

25 a substrate having a spot of substantially circular  
concave shape; and

a groove that is formed on said substrate and linked

to a portion of a perimeter of said spot;

wherein at least a portion of a planar optical waveguide is formed in said groove;

wherein an optically reflective film is formed on an  
5 inner surface of said spot;

wherein an end face of said planar optical waveguide is located at a periphery of said spot; and

wherein light that is guided by said optical waveguide enters said spot from said end face and is  
10 focused on a focal point that is determined by said substantially circular concave shape.

4. A light-wave circuit module comprising:

a substrate having a spot of substantially circular  
15 concave shape; and

a slanted path that is formed on said substrate and linked to at least a portion of a perimeter of said spot;

wherein at least a portion of a planar optical waveguide is formed on said slanted path; and

20 wherein, on an inner surface of said spot, an optically reflective film is formed at least on a side that is in opposition to the side linked to said slanted path.

5. A light-wave circuit module comprising:

25 a substrate having a spot of concave shape; and

a groove that is formed on said substrate and linked to a portion of a perimeter of said spot;

wherein at least a portion of a planar optical waveguide is formed in said groove;

wherein an optically reflective film is formed on an inner surface of said spot; and

5 wherein a bottom surface of said groove is located near a bottom surface of said optically reflective film in said spot.

6. A light-wave circuit module comprising:

10 a substrate on which a plurality of spots of substantially circular concave shape are formed; and

an optically reflective film formed along inner surfaces of said spots;

15 wherein said spots are linked by a planar optical waveguide.

7. The light-wave circuit module according to claim 6, wherein said planar optical waveguide includes branched portions;

20 wherein said branched portions are linked to said spots, and at least a portion of said branched portions has the function to transmit or reflect a certain wavelength; and

wherein photodetectors are provided above said spots.

25 8. A light-wave circuit module comprising:

a substrate having a first surface and a second

surface substantially in opposition to the first surface;

a spot of substantially circular concave shape that is formed on said first surface of said substrate; and

an optically reflective film that is formed along an  
5 inner surface of said spot;

wherein a first planar optical waveguide is provided on said first surface;

wherein a second planar optical waveguide is provided on said second surface;

10 wherein said first planar waveguide is linked to said spot;

wherein a through hole connecting said first surface and said second surface is formed in a portion of said spot; and

15 wherein said second planar optical waveguide is linked to said spot through a translucent medium that is filled into said through hole.

9. The light-wave circuit module according to claim 1,  
20 wherein said planar optical waveguide is made of a transparent translucent resin.

10. The light-wave circuit module according to claim 3,  
wherein said planar optical waveguide is made of a  
25 transparent translucent resin.

11. The light-wave circuit module according to claim 4,

wherein said planar optical waveguide is made of a transparent translucent resin.

12. The light-wave circuit module according to claim 5,  
5 wherein said planar optical waveguide is made of a transparent translucent resin.

13. The light-wave circuit module according to claim 6,  
10 wherein said planar optical waveguide is made of a transparent translucent resin.

14. The light-wave circuit module according to claim 8,  
15 wherein said planar optical waveguides are made of a transparent translucent resin.

15. A method for manufacturing a light-wave circuit module including a substrate having a spot of substantially circular concave shape and an optical waveguide linked to said spot, said method comprising:

20 a step of preparing a substrate made of a polymer sheet; and

a step of forming a concave surface of said spot by subjecting said substrate to embossing by applying at least one selected from heat and pressure.

25 16. A light-wave circuit module, comprising:

a concave portion having a substantially circular

arc-shaped surface or substantially spherical surface,  
formed on a substrate;

an optical waveguide formed on said substrate; and

a photodetector arranged above said concave portion

5 and receiving light that has been transmitted by said  
optical waveguide and reflected by said concave portion.

17. The light-wave circuit module according to claim 16,  
wherein at least a portion of said optical waveguide is  
10 slanted with respect to a principal surface of said  
substrate.

18. A light-wave circuit module, comprising:

a step portion having a substantially circular arc-  
15 shaped surface or substantially spherical surface, formed  
on a substrate;

an optical waveguide formed on said substrate; and

a photodetector arranged above said step portion and  
receiving light that has been transmitted by said optical  
20 waveguide and reflected by said step portion.

19. The light-wave circuit module according to claim 15,  
wherein an optically reflective film is formed on an inner  
surface of said concave portion.

20. The light-wave circuit module according to claim 17,  
wherein an optically reflective film is formed on an inner

surface of said concave portion.